

CIRCULAR.

GEORGETOWN, D. C., December, 1848.

SIR: I have taken the liberty of forwarding to you for examination a small pamphlet containing a very imperfect account of certain general laws relating to Physiology, which I believe to be new to the science.

I wish to call your serious attention to one of those general laws, at this time, that you may be enabled to form some estimate of the credibility to be attached to the mere annunciation of the rest. This law is: *That the action of the living animal fibre consists in extension, and not in contraction*, as has always been supposed. That the subject of investigation may be narrowed down, it is proposed to confine our attention to that form of fibre termed muscular.

This law was traced out, in the first instance, by reflecting on phenomena presented in the human subject, but, as it is still more plainly legible in the phenomena to be met with in the lower orders of animals, I beg leave to refer to some of the latter.

It is not designed, in this communication, to enter into any formal refutation of the received opinion on this subject, or into an elaborate argument in support of our position; it is merely intended to enumerate some few instances, out of many, in order to facilitate your reference to them, with the details of which you are, no doubt, familiar.

If, on a closer examination than you have heretofore given to the explanations found in books of some of the functions of those animals, you shall discover that such explanations are in the highest degree absurd, and that no other explanations can be given with our present understanding of the laws of the animal economy, you may come to see the necessity of amending those laws, by adopting the one which I have proposed.

We will first enumerate some instances of the action* of the voluntary straight muscles.

*The condition of a muscle, when in a state of action, has been so little attended to, I might say, so entirely misapprehended by Physiologists, that I shall be excused for calling attention to it.

When its cause of action of the nervous fluid is determined to a muscle, it is elongated, and, if the innervation is carried to a certain extent, it becomes stiff and rigid; in extraordinary exertions the muscle becomes as firm and inflexible as a rod of steel. M. Brussaïs evidently alluded to this state of the organ when he used the term, "vital erection," although he seems to have formed no definite notion of its actual condition, or of the nature of its cause. The increased flow of blood is clearly referable to another law of the economy, entirely distinct from the one we are now considering. The supply of blood is essential to the due performance of the function of the nerves, but not at all essential to the action of the fibres, which derive their cause of action from the nerves.

The eye of the snail, placed at the extremity of its horn, or rather a fleshy tube attached to its head, is said to be retracted or drawn in by means of the retractor muscle, which arises from what is called the foot of the animal, and is inserted at the extremity of this horn or tube.

The protrusion of the eye is said to be effected by the contraction or constriction of the circular fibres of the horn immediately behind it.

Not to dwell on the absurdity of this explanation of the latter function—on the impossibility that the constriction of the circular fibres of the tube should overcome the contraction of the retractor muscle, which is largely developed—on the fact, that if this could be done, yet the constriction of those fibres must, by compressing the optic nerve, effectually prevent the exercise of the function of vision, the fallacy of the explanation may be proved by stating one simple fact: *When the eye of the snail is protruded no contraction of the fibres, or constriction of the walls of the tube, are observable.* On the contrary, it is dilated or expanded; and, by holding the animal up between the light and the eye, any one may see, with the naked eye, the muscle, with the optic nerve, extended and lying along on the lower side of the tube, but not even in contact with the superior portion of its walls in any part of its extent.

The truth is, the protrusion, as well as the retraction, of this organ is effected by means of what is called the retractor muscle. The animal determines its nervous fluid to this muscle, and thus causes its extension, or withdraws that fluid to its nervous centre, and causes its contraction.

The next instance to which I would refer may be found in the class of animals termed Bryozoa.

The operculum in these animals is protruded and retracted at will, like the eye of the snail. Dr. ARTHUR FARRE, to whom science is said to be indebted for a most accurate and beautiful delineation of its anatomy, was much puzzled to find out by what means this animal protruded its operculum. Unfortunately for the cause of science, the Doctor discovered in some specimens traces of transverse fibres about the walls of the stomach, which he supposes, by contracting, forces out the fluid contents of the stomach, and with them the operculum. I say unfortunately, because, if he had contented himself with simply giving the anatomy of the operculum and its muscles, and left the transverse fibres of the stomach alone, some one, in contemplating this structure, might have been led to the discovery of the general law which I now propose. These animals have nothing more to do than to determine their nervous fluid to or from the muscles attached to their opercula in order to protrude or retract them, and they may make use of the transverse fibres of their stomachs to increase the capacity of those organs for the reception of the food which flows into them when the opercula are protruded.

I might refer to the action of the tongue in all animals as instances

of this general law; and, to show that protrusion may be effected by the extension of their peculiar fibres, it is only necessary to place the finger on the os hyoides, in our own person, and then elongate the tongue; but I would particularly refer to the function of the tongue of the chameleon.

The explanations given of the function of this organ by Mr. JOHN HUNTER, by CUVIER, and by Mr. HOUSTON, in the transactions of the Irish Academy, are too improbable to require any particular notice.

An attentive consideration of the phenomena presented in the function of this organ must furnish to any unprejudiced mind the strongest proof of the correctness of our position.

In further corroboration of this point I refer to the tongue of the anteater and of the woodpecker—to the muscles by which the limbs and head of the terrapin are protruded, and particularly to the muscles attached to the valve of the plastrum or lower shell in the land terrapin.

Locomotion in all animals is mainly effected by the extension of the muscles; but to give a rational account of that in leeches, worms, and in all creeping animals, the law in question is indispensable.

As intermediate between the straight muscles and the fibres placed around the walls of tubes, I refer to the spiral muscles found in the trachea of insects, which, by elongation, increase the calibre or diameter of those tubes, and by contraction diminish it.

For the action of the fibres about the walls of the tubes or hollow organs, I refer to the sucking stomach of insects which Treviranus saw expanded and contracted at will—to similar organs in the leech, &c.—to the respiratory organs in terrapins, frogs, &c.—to the genito-urinary organs, especially of females—to the œsophagus, stomach, and intestines—to the arteries, &c., &c. In short, notwithstanding that it is formally stated, as an axiom in Physiology, that the tendency of the action of the tubes or hollow organs is to obliterate their calibres or cavities, *I confidently lay it down, as an incontrovertible fact, that, whenever the vitality of a tube or hollow organ is exalted, or, in other words, whenever the cause of action or nervous fluid is determined to the fibres about the walls of a tube or hollow organ, the calibre or diameter of that tube or organ is increased, and that, too, in proportion to the determination of the nervous fluid.*

Should you consider the subject of this communication worthy of notice, I should be glad to know the result of your reflection upon it.

Your obedient servant,

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